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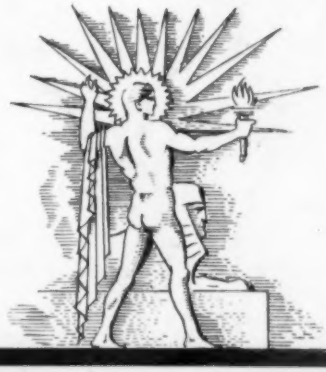
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



June 11, 1938

Not a Tiger

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A SCIENCE SERVICE PUBLICATION

Do You Know?

The earliest Greek columns were tree trunks inverted to retain the sap.

In medical usage a guillotine is an instrument for cutting off a tonsil or uvula.

The giant panda and the ordinary panda of Asia are both relatives of America's raccoon.

Starlings have spread westward in the United States until they now apparently breed in eastern Texas.

An elephant has to sway its whole body in order to look around, because it cannot turn its head much.

The packs of fierce dogs owned by Plains Indians were a serious handicap when the Indians tried raising horses.

Compiling all available evidence, British meteorologists have surveyed British weather from 2668 B. C. to 1450 A. D.

There were city ordinances against skyscrapers in medieval Europe—Paris, no buildings over 60 feet, Florence none over 100.

An ornithologist points out that some small birds like the hummingbird are quick tempered; while bigger birds, such as the flicker, are obvious cowards.

Elephants when awake seem to be continuous motion, with tail, ears, or body swinging, and even in sleep an elephant frequently changes position.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

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What sort of radio signals can interfere with earthquake records? p. 375.

The electric eye can be used to open dental cabinet drawers, permitting the dentist to open a drawer without risk of transferring germs from his hand to the cabinet.

Ancient Egypt shipped roses to Rome, says Richardson Wright, garden authority; but, he adds, "no one has yet discovered the secret of how they were kept fresh during that long journey."

SCIENCE NEWS LETTER

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MEDICINE

New Whooping Cough Vaccine Promises Better Protection

From 400 to 500 Children Vaccinated in Effort to Test Its Value in Comparison With Unvaccinated Group

BETWEEN 800 and 1,000 children somewhere in the United States, all born since July, 1935, are going to show scientists within the next two years whether or not a new whooping cough vaccine prepared at the U. S. Public Health Service's National Institute of Health gives better protection against this serious childhood plague than the vaccine now in use.

Dr. W. T. Harrison, Senior Surgeon, U. S. Public Health Service, who is in charge of this new disease-fighting venture, has just returned from an unnamed city where he superintended the vaccination of from 400 to 500 of the children. He said that the name of the city must be kept secret or the test will be spoiled because mothers of unvaccinated children will insist on having their children vaccinated.

Since there is no test for immunity to whooping cough like the Schick test for diptheria, the only way to learn the effectiveness of the new vaccine is to watch two large groups of similar children, one vaccinated and one unvaccinated, and see how many in each group gets whooping cough or fails to get it in the natural course of events. This will require about two years' time.

Very encouraging results were obtained with the new whooping cough vaccine in its first trial in Cumberland, Md. Reporting these results in the current issue of the Public Health Reports, Dr. Harrison and associates, Dr. Joseph A. Bell of the U. S. Public Health Service and Dr. Joseph P. Franklin, Deputy State Health Officer, Maryland, were extremely conservative because of the small number of children in the group.

Not Conclusive

Among 82 vaccinated children, 10 cases of whooping cough developed during the year, while among 109 unvaccinated there were 21 cases of whooping cough. This is considered too small a difference to give conclusive evidence of the vaccine's value and that is why the larger trial has been started.

The new vaccine is prepared by precipitating the Sauer whooping cough vaccine now used with alum, a process something like that used to prepare diphtheria toxoid for diphtheria immunization. The alum precipitation treatment makes it take much longer for the vaccine to be absorbed by the body. This gives a chance for more disease-fighting, whooping cough antibodies to be formed in the body and should therefore give greater protection against the disease. Another advantage is that only two doses of the new vaccine are used, whereas with the old type six doses, one in each arm at three different visits, must be given.

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PALEONTOLOGY

"Rod-and-Bead" Markings Are Not Worm Casts

WORM casts or seaweed? Markings in the Salem limestone of Indiana, widely used building material, have been the cause of a friendly debate between Dr. Titus Ulke, veteran naturalist of Washington, D. C., and Prof. Robert R. Shrock, geologist of the Massachusetts Institute of Technology.

The point at issue seems now to be settled in favor of Dr. Ulke, with the publication (*Science,* May 14) of a statement by Prof. Shrock that he has checked Dr. Ulke's observations, "and believes that the suggested origin warrants serious consideration."

The markings in question consist of flattened-out tubes or cylinders, interrupted here and there by flattened bead-like structures. Prof. Shrock first interpreted these as worm casts left on the oozy bottom of the sea where the limestone was once a soft, calcareous mush. Dr. Ulke raised several points indicating that they might rather have been slender seaweeds.

They always lie flat on what was once the surface of the bottom, for example; the material within the rods and beads is the same as that of the surrounding limestone; they are separated from the matrix by a shallow, groovelike depression as though there had once been a delicate shell or body wall. Dr. Ulke cited several other seaweed-like features. And Prof. Shrock now assents.

An interesting feature of Dr. Ulke's study was that the principal specimens he examined were neither in a museum nor in the quarries where the limestone is produced. They consist of the steps of a Washington church, which were built of Salem limestone.

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SEISMOLOGY

Radio Signals Interfere With Earthquake Records

HOW one kind of research can unexpectedly interfere with another was described by E. A. Hodgson, of the Dominion Observatory, Ottawa, who has installed a new Benioff seismometer.

In this instrument, a sensitive short-period galvanometer records an electric current whenever there are earth tremors. Changes in the strength of the current indicate all the features of the earthquake.

It was found that regular disturbances were being recorded by the galvanometer which were not due to seismic tremors, and these were traced to the regular short wave radio signals sent out second by second through the 24 hours of every day by the Dominion Observatory. A rectifying contact in the control assembly transmitted this signal to the Benioff galvanometer.

A longer signal, also sent out regularly, had no effect upon the seismic records.

Science News Letter, June 11, 1938

NOT WORMS

The markings in this Washington, D. C., church step of the Salem limestone of Indiana, are not fossil casts of worms but are the remains of ancient seaweed.

ANCIENT TOOLS

At the left is a chopper used by an American who lived even before the Folsom Man. At the right is a spear head of Folsom make showing the groove characteristic of their workmanship.

ANTHROPOLOGY

15,000-Year-Old Stone Tools Reveal Dawn Men of America

In California Have Been Discovered Crude Traces Of Pioneers Who Lived Before Famous Folsom Man

DISCOVERY of strong evidence that America had two prehistoric waves of pioneers before the famous Folsom hunters arrived on our shores is reported by the Southwest Museum.

The discovery is pronounced "of major importance to American archaeology." It is as surprising an addition to our prehistory as though it had been found that two boats earlier than the Mayflower bore colonists to New England shores in our historic era.

A joint expedition of Carnegie Institution of Washington and Southwest Museum, led by M. R. Harrington of the latter institution, unearthed stone relics of the long-departed and long-lost Americans. Investigating the shore of a brackish pond in Lake County, California, where C. C. Post of Berkeley had found spearheads of one of the oldest known cultures of America, the archaeologists found brand new chapters of prehistory opening before them.

The surface layer, turned topsy-turvy by recent ploughing, contained spear heads, knives, drills, and scrapers typical of the Folsom hunters. With such implements, Folsom Men killed the mammoth and giant bison and prepared the kill for food and clothing. Seven to twelve thousand years ago is the loosely estimated antiquity of this Folsom era.

With Folsom Man's handiwork the archaeologists found quite different stone spear heads and other implements. These different tools have recently been turning up at Lake Mohave and another western site, leaving archaeologists doubtful as to whether they had found people older than the Folsom hunters, or not. Now, the mystery is believed solved, since digging into the Lake County site revealed the Mohave type of tool in a camp deposit definitely below the Folsom tools—and therefore older than the Folsom tools.

There may have been, not merely one, but two kinds of primitive pioneers inhabiting America in those pre-Folsom days, at the same time. For Mr. Harrington reports finding a new type of spearhead, which he calls the Borax Lake type, buried at about the same levels as the Lake Mohave tools.

Most surprising of all, was the discovery that below all these relics lay still older weapons, made by people, "as yet entirely unknown quantities in American archaeology." These dawn men of America made crude and coarse stone implements, described by the archaeologists as mainly large scrapers and hand axes which they clutched in the fist, using no handle.

Finding the deep levels of the site thus undisturbed after thousands of years convinced Mr. Harrington that these unkown ancients lived about 13,000 B. C., or perhaps earlier.

The Southwest Museum says, "These are staggering figures to persons under the spell of the misleading implications behind the term 'New World,' but evidence is accumulating throughout the Americas that this hemisphere is no more new than its great western ocean is pacific."

Science News Letter, June 11, 1938

PHYSICS

Research Finds Secret Of Tone in Old Violins

AFTER TWO centuries, it now appears that scientific research is disclosing the secrets behind the tonal beauty which has rightly made famous the instruments of Stradivarius, Amati and other old Italian violin-makers. Of more practical importance to all lovers of music, the researches of modern science are showing what must be done to make instruments comparable in tonal qualities with those of the old masters.

Although many men, including some of the best scientists in the world, have tackled this problem, it has been only recently that progress has been made. The ability to amplify sound waves electrically and to present a visual picture of the wave characteristics on an oscillograph are the two key research wedges which are prying apart the long-lost secrets of an old violin's tones.

Once the wave form of a tone from a violin is obtained it is possible, by harmonic analysis, to discover the distribu-

tion of the sound energies among the fundamental tones and overtones. It is this distribution which sets off a Stradivarius from just another "fiddle."

Such overtones are caused by the multiple vibration of the bowed string. The existence of these extra vibrations can be shown by placing several little "saddles" of paper over the string and bowing it. Where the vibration is intense the saddles jump off. Where vibration nodes exist the saddles stay in place.

The Danish scientist Poul Jarnak, working in the United States through funds of the H. C. Oersteds Foundation, Copenhagen, has not only made studies on the tones of violins but has developed experimental instruments which compare very closely in tone with expensive 17th century Italian violins. This comparison is made not only by the oscillograph records but also by the ears of trained musicians, says Mr. Jarnak in a report published in the Journal of the Franklin Institute.

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'WAY DOWN DEEP

Curator M. R. Harrington of the Southwest Museum shows where he has found stone tools used by prehistoric Americans of surprising antiquity. Buried under seven feet, five inches, of accumulating earth, these stone tools, he says, mark the camp site of unknown primitives who invaded American shores about 15,000 years ago. These new-found Dawn Men will replace Folsom hunters in scientific annals as the earliest known people in America. The discovery site is in Clear Lake Park, California.

MEDICINE

Benzedrine Sulfate Is Found a Speedy Cure for Hangovers

Physicians Warn Against Going to the Drugstore For a Dose, However, Go to the Hospital Instead

SOBERING up is a speedy process by the benzedrine sulfate method, but—

Unless the man with a hang-over is in the hospital it is not safe for him to use the drug.

Drs. Edward C. Reifenstein, Jr., and Eugene Davidoff of the Syracuse, N. Y., Psychopathic Hospital, give this warning in the course of an otherwise enthusiastic report. (*Journal, American Medical Association,* May 28)

The doctors have treated 28 patients with psychosis (mental disorder) due to intoxication from alcohol, and 93 per cent. of them showed definite and at times a marked acceleration of improvement. Pathologic intoxication, delirium tremens, acute hallucinosis and Korsakoff's psychosis were the conditions from which the various patients suffered.

In just plain, every-day drunkenness, where no psychosis was present, an even more satisfactory result was attained. In these cases the depressive effects of a hangover — headache, fatigue, languor and mental retardation — disappeared within an hour or so after a morning dose of the benzedrine sulfate.

However, the Syracuse physicians are convinced that the drug in itself is habit-forming. It is open to question whether it should be administered to persons who have shown a tendency to addiction by their chronic alcoholic habits.

Only by restricting its use to hospital patients where the supervision is adequate can it be called safe to use, Drs. Reifenstein and Davidoff feel.

They fear not only addiction but untoward effects or serious toxic reactions among persons who seek the drug themselves from the corner pharmacy.

Under hospital conditions, however, they are hopeful that it may prove of value in overcoming the chronic alcoholic habit.

Their theory is that the benzedrine sulfate may produce these beneficial responses in alcoholic states through its action in stimulating the central and sympathetic nervous system and also directly by neutralizing and antagonizing the alcohol itself.

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PHYSICS

M.I.T. Gets Grant For Solar Energy Use Research

METHODS of creating "sun power" by converting the tremendous amount of solar energy into some form in which man can use it as a source of power will be the goal of a comprehensive program of chemical, electrical and mechanical research to be undertaken in the near future at the Massachusetts Institute of Technology.

Enabled by a $647,700 gift from Dr. Godfrey L. Cabot of Boston, the research will be devoted specifically to a search for direct means of converting the sun's radiant energy into useful power or storing such energy for future use. Under the terms of the gift the income from the fund must be used in these studies for at least 50 years, after which it may be diverted to other purposes at the discretion of the Institute's corporation.

While scientists at Technology will concentrate on direct physical and chemical methods of using solar energy, research workers at Harvard University, which received a similar grant from Dr. Cabot last year, are making a pioneering study of the possibilities of speeding up the growth of trees, and thus "streamlining" the conversion of sunlight into forms suitable for human use.

In announcing the gift, Dr. Karl T. Compton, M. I. T. president, commented on the enormous potential power of

solar energy, pointing out that heat from the sun reaches the earth in the temperate zones at an average rate of approximately four million calories per square yard daily. In the three months of greatest sunshine an acre of land, he estimated, receives directly from the sun an amount of heat equivalent to that which would be produced by the burning of about 250 tons of first-class coal.

"The store of energy in our familiar fuels, while great, is not inexhaustible," he continued, in pointing out the importance of such research.

A primary object of the project will be to determine whether use of solar energy is economically feasible and practical. Solar energy devices already proposed and studied elsewhere will be evaluated with this point of view in mind. The second aspect will consider chiefly the feasibility of developing new conversion equipment using phenomena now under study which hold promise of ultimately being useful in the solution of this problem.

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MEDICINE

Head-Hunter Doctors Set Broken Bones With Chicle

DOCTORS of the Jivaro head-hunting tribe on the Amazon are good bone setters, and use casts of chicle—basis of chewing gum—to hold broken bones in place.

What a family doctor's life is like in this tribe famed mainly for its head hunting, is reported by Matthew W. Stirling, chief of the Bureau of American Ethnology, who ventured successfully into their supposedly dangerous communities.

A Jivaro doctor, called a wishinu, has to study one month before he is considered ready to practice, but there are only six kinds of disease spirits supposed to cause most human troubles. He also has to learn to treat colds, fever and dysentery with specific herbs. His rigid code of medical ethics requires him to answer a sick call at any hour of day or night through trackless jungle. If he fails to cure he may be "sued" for malpractice, which in Jivaro legal machinery means he may lose his head or be required to pay the value of the lost patient's life.

Jivaro doctors are able, honest, and idealistic, Mr. Stirling found. And more often than not they are wealthy.

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PHYSIOLOGY

Dosage of Carotene-in-Oil Eases Eyestrain, Fatigue

EYESTRAIN and fatigue, common complaints among those doing work that requires close attention, have been relieved among color matchers of the Westinghouse Electric and Manufacturing Company by daily doses of carotene-in-oil, a source from which the body manufactures vitamin A, Drs. Ralph C. Wise and O. H. Schettler report. (*Ohio Medical Journal*, June)

Three capsules of carotene-in-oil daily, they declare, by speeding up the regeneration of visual purple, light-sensitive substance in the eye, have improved the efficiency of color-matching inspectors by 75 per cent.

Color inspectors of the company had long complained of severe headaches, burning and smarting eyes. Many of them declared they were unable to read in the evening after work or stated that they actually feared night driving. These conditions have now been changed by use of the new treatment, Dr. Wise, an eye specialist, and Dr. Schettler of the company's medical department, assert.

Basis for giving the carotene-in-oil is the fact that visual purple, the light-sensitive substance in the retina of the eye, is decomposed in the process of seeing and can be regenerated only in the presence of vitamin A. Dosing with carotene in effect increases the body's supply of the vitamin so essential to proper seeing. Lack of vitamin A is known to be a cause of night blindness, an eye defect held responsible for a large share of the mounting toll of night automobile accidents.

The possibility of applying this same treatment to other industrial workers required to do eye-fatiguing work is held out by the Ohio doctors.

An interesting by-product of the tests, which Dr. Wise expects to repeat elsewhere, was an appreciable improvement in the health of the workers treated, particularly in cases where fatigue headaches and eye-strain were chronic. Several workers reported gains in weight.

The eye-strain is produced not only by the close application of the eyes required, but also by the unusually bright light in which the work must be done. This light, the doctors note, has a tendency to destroy visual purple and reduce the "light threshold." Measurements conducted with special equipment showed, they state, that the rate of regeneration of visual purple was increased.

The new system is said to be saving the company several thousand dollars a year as well as saving employes' vision.

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DENTISTRY

Grade-School Children Need Much More Dental Service

GRADE-SCHOOL children need six times the amount of dental service they are now getting if the cavities they are going to get in their permanent teeth are to be treated. This appears to be one conclusion of a survey of school children's teeth and dental service made by Drs. Henry Klein, Carroll E. Palmer and John W. Knutson, of the U. S. Public Health Service.

The survey was made of the grade-school children of Hagerstown, Md., a city of about 30,000 population which is "representative of the broad middle range of socio-economic groups in the United States."

About 10,000 temporary and 8,000 permanent teeth in mouths of 4,416 of the city's 4,700 grade school children have cavities that need to be filled. In addition to the total of 33,000 defective untreated tooth surfaces, 7,745 permanent tooth surfaces have been lost by caries or decay.

The magnitude of the caries problem in grade-school children, according to the findings of this survey, is "of such order as to make difficult its immediate practical handling with existing facilities and knowledge," the scientists state in their report. They suggest, however, a plan which may prevent such an ac-

cumulation of dental defects as they found.

According to this plan, in the first year of its operation all defects in permanent teeth of all first-grade children will be taken care of. In the second year any new defects in permanent teeth of these children, by then in the second grade, plus all defects in permanent teeth of all children in the new first grade will be cared for.

"After the operation of the plan for 8 years, all grades of the elementary school population will have received, systematically, treatment for yearly increments of defects," the doctors point out.

All dentists in the community would be expected to take part in the plan. During the first year two-thirds of one per cent. of available professional dental services of the community would be needed and this amount would increase gradually until the eighth year when 10 per cent. of existing professional services would be required to care for that 15 per cent. of the population which attends the elementary schools.

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CHEMISTRY

Lignin a Source of Valuable Chemical Raw Materials

Lacquer Solvent, Wood Preservative, Varnish Ingredient, and Clear Resin Made From This "Waste"

CHEMISTRY is at last learning a way to convert lignin, great waste product of the nation's forests, into highly valuable raw materials.

In a report issued jointly by the U. S. Forest Products Laboratory and the University of Wisconsin, a laboratory method of converting lignin into useful materials is described.

They include: a well-known organic solvent, wood alcohol; a new compound, propyl-cyclohexanol, which appears suitable as a lacquer solvent and which has also possibilities as a wood preservative; two compounds having possible use as thickening and toughening agents for varnish; and a clear, glassy resin, extremely adhesive, which has excellent potentialities as a plastic material.

The process of hydrogenation, already used to make petroleum oils out of coal and cooking fats out of vegetable oils, is the one employed in turning lignin, once a waste, into a valuable forest resource.

Atoms of hydrogen are added to the lignin solution by means of heat and pressure. By this severe treatment the dissolved lignin is changed from a dark-brown color to transparency. The different compounds created are removed by distillation.

The encouraging work, still in the experimental stage, is the latest development in the long course of research, seeking valuable uses of lignin, which has been carried on by Drs. E. C. Sherrard and E. E. Harris of the Forest Products Laboratory. The present hydrogenation experiments were performed in cooperation with Dr. Homer Adkins of the University of Wisconsin, who discovered the effectiveness of the copper-chromium oxide, used as a catalyst in the tests.

Lignin comprises from 20 to 30 per cent. of the stems of trees and other woody plants. In the current research it is estimated that more than 70 per cent. of this lignin can be converted into chemical raw materials having industrial possibilities.

The yield of wood alcohol obtained is several times as great, by the new process, as it is from the usual distillation of wood alone.

One ready source of large supplies of lignin is the 1,500,000 tons of the material, annually discarded by factories making pulp for rayon and for the better grades of white paper. Research is now in progress to free these waste liquors of their sulfur content. If this can be done on a commercial scale, such plant wastes will turn into valuable raw materials for chemistry.

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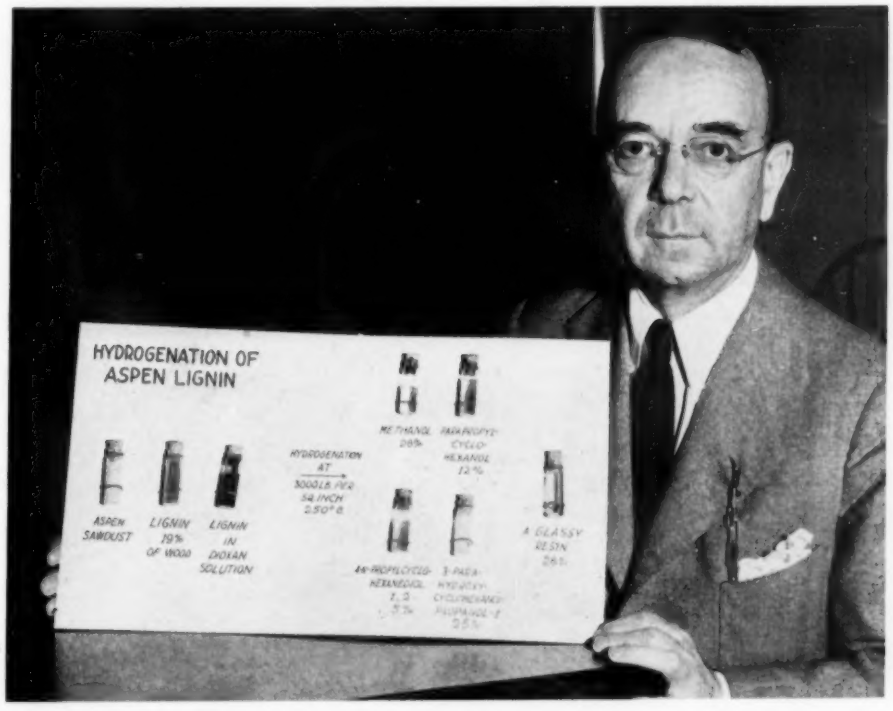
Woodpeckers are rated as valuable conservers of the forest, because they get insects that other birds cannot reach.



FROM LIGNIN

Dr. Carlile P. Winslow, director of the U. S. Forest Products Laboratory, Madison, Wisconsin, holds a chart showing sample bottles of the materials which chemistry now obtains from lignin. Once a major waste product of the nation's forest which had to be laboriously removed in many industrial processes, lignin is now turned into five valuable products including wood alcohol, two thickening and toughening agents for lacquers, a glassy plastic and a wood preservative and lacquer solvent.

METEOROLOGY—PUBLIC HEALTH

Incalculable Numbers of Germs Rode Dust Storm

SECRETARY Cordell Hull's trade treaties had nothing whatever to do with one of the largest import shipments ever received in Canada from the United States. The consignment traveled by air, at that.

A spring snowstorm that covered a considerable part of Ontario province came down exceedingly dirty. It carried with it a vast quantity of air-borne dust that had started in the western United States as a dust storm.

Dr. A. G. Lochhead of the Canadian Department of Agriculture collected some of the dusty snow and made bacterial analysis of it. (*Science,* May 27) He found that there were on the average 4,370,000 germs per gram of dust. Since a gram is about a thirtieth of an ounce avoirdupois, this figures out roughly as about 125,000,000 germs per ounce—and in an ordinary dust storm many thousands of tons of soil can be transported. How many individual microbes were transferred from American soil to Canadian in that one shipment is simply beyond telling in figures that would mean anything.

It should be added, however, that all of the organisms found by Dr. Lochhead in his samples were harmless soil-dwelling species.

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GEOLOGY

"Layer-Cake" Geology Indicates New Oil Sources

NEW oil fields, in places where the present prospecting methods give no oil indications, will extend the life of the oil industry in the United States far beyond the commonly fixed fifteen-year limit, Dr. A. I. Levorsen, Tulsa, Okla., consulting geologist and former president of the American Association of Petroleum Geologists, predicted.

Comparing the earth's surface to a giant layer cake, Dr. Levorsen suggested to the Geological Society of Washington that our present methods are effective only in the top layer, while possible oil sources exist in the lower layers, which may contain structures not apparent to surface observers. The lower layers of rock, thousands of feet under the comparatively level surface, may be arched up into domes, broken by faults, or squeezed to resemble a gigantic jelly-roll.

Cheaper drilling, lowering the cost of prospecting, and making commercial production possible from fields that will produce small quantities of oil, is now possible at the rate of a dollar a foot of hole down to 2,000 feet. Designers of drilling machinery, using hydraulic pressure to speed the cutting, hope soon to have drills that will penetrate 5,000 feet for $5,000.

Surveys of the rocks near an oil well are speeded by side-hole coring equipment and Schlumbirge (pronounced "slumberjay") surveys, which tell, after the hole is drilled, just what rocks have been penetrated. The Schlumbirge survey is a method of telling, by measurements of the electrical resistance of the rocks, just what their extent is.

These new methods, says Dr. Levorsen, will lead to the discovery of many new oil pools, giving oil geology "plenty of future."

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MEDICINE

Effective Horse Vaccine Made From Chick Embryos

A NEW vaccine to protect horses against the serious disease, equine encephalomyelitis, sometimes called "horse sleeping sickness," has been developed by scientists of Duke University School of Medicine and the Lederle Laboratories at Pearl River, N. Y.

The new vaccine proved more than ten times as effective in guinea pig trials and has been completely successful in preliminary horse protection studies, Drs. J. W. Beard, Harold Finkelstein and W. C. Sealy of Duke and Dr. R. W. G. Wyckoff of the Lederle Laboratories report. (*Science,* May 27)

Equine encephalomyelitis has been increasing in many parts of the United States during the past years. Although caused by a virus, as is the somewhat similar human disease, encephalitis, a vaccine for protection of animals had been prepared from brain tissue of animals dying of the disease. The new, much more effective vaccine reported is prepared from chick embryo tissue.

The greater effectiveness is attributed to the fact that the virus of the disease grows much more abundantly on chick embryo tissue than on horse brain tissue. Evidence of this is the fact that Dr. Wyckoff has been able to isolate from infected chick embryos, but from no other tissues, a substance which seems to be the infectious agent or germ of the disease.

Science News Letter, June 11, 1938

IN SCIENCE

ENGINEERING

Germany Saves Copper In New Locomotives

RAILROAD locomotives are the latest devices which German ingenuity is redesigning in efforts to conserve materials that ordinarily are largely imported, and to substitute for them those materials which the Reich has within its boundaries.

Typical strategic mineral raw material for Germany is copper and its alloys, brass and bronze. In new German steam locomotives substitution of materials has made possible the saving of 15,432 pounds of copper for each one! Already 350 of them are in service with steel replacing copper in the boilers and in the boiler tubing.

Each new electric locomotive, also, under the new design, shows an additional saving of 8,818 pounds of copper. The armatures of motors, the bindings and similar parts are now made out of malleable cast iron and steel to which a thin surface of conducting aluminum has been applied.

While Germany is thus saving copper and copper alloys, engineers in America are wondering about the efficiency of the changed, copper-saving design. Copper is more than five and a half times as efficient in heat conduction as iron. That means more coal must be burnt in the new locomotives with their iron boilers to get comparable heating of water and steam generation.

In the same way copper is more than four and a half times as efficient in electrical conduction as aluminum. That is, for equal size aluminum and copper wire, the former has much greater electrical resistance. Such resistance shows up in a wire as heat. When heat is generated it means energy lost for creating magnetic fields and all the other reactions on which electrical power depends.

That Germany is willing to sacrifice efficiency for copper saving is a testimony of the drive for self-sufficiency which underlies the whole present program of the Reich.

Science News Letter, June 11, 1938

NCE FIELDS

PUBLIC HEALTH

Physicians Urge Retesting Of Immunized Children

RENEWED efforts to keep diphtheria under control are necessary if the nation's children are to be protected against this horrible and often deadly disease. Physicians are warned of the situation by a report from Drs. A. B. Schwartz and F. R. Janney of Marquette University School of Medicine, Milwaukee, to the American Medical Association.

It is wrong, these physicians point out, to assume that once a negative Schick test has been obtained, the child's immunity to diphtheria is permanent.

The baby who at nine months old has been protected against diphtheria may have lost his immunity to the disease by the time he enters school at the age of five or six. During the last year or two there has been an apparent increase in the incidence of diphtheria among supposedly immune children.

In order to maintain the present low incidence of diphtheria in the United States, the Milwaukee physicians recommend that one of two measures be taken:

All children entering school should be given either a routine Schick test or a routine dose of one cubic centimeter of toxoid.

Recently two Canadian physicians, Dr. D. T. Fraser and K. C. Halpern of the University of Toronto, found that, upon retesting, one-third of the children once made immune had lost their immunity within five years.

Science News Letter, June 11, 1938

ARCHAEOLOGY

Egypt's Furniture Line Was Highly Modern

EGYPTIANS made their furniture to last. And it certainly has.

Archaeologists take bedroom and dining room sets out of royal tombs in that dry land, and with judicious repairs the furniture stands good as new.

At least, it looks marvelously preserved. The wood foundation of a chair or other piece sometimes has to be replaced because it has rotted or shrunk within its golden sheath. But beautiful effects of gold, ebony, ivory, carved wood, and inlay work, tapestry and painted designs—all these have survived their civilization with amazing endurance.

Even when practical-minded Egyptians turned out cheap, made-to-order furniture for a tomb, this stage furniture, so to speak, has lasted. We shouldn't dare trust weight to one of these wood and plaster "prop" chairs that imitates rich inlay and tapestry. But then the tomb owner wasn't expected to sit in it, when it was brand new.

Value of these ancient pieces, of course, is not to teach any lesson as to how long furniture should last. It is significant rather in showing how modern and beautiful was Egypt's line of furniture. Or, to put it the other way around, how few basic inventions in furniture have been made since the days of the Pharaohs.

Beds generally resembled daybeds, but there was a variety of styles. Chairs included arm chairs, armless dining chairs, carrying chairs to be lifted by bearers, folding chairs. There were cushions and footstools, for added comfort. Individual dining tables were made, and occasional tables of many types. Chests and cases were designed to hold jewels, linens, and other personal possessions.

Writing desks they did not have, since scribes sat cross-legged on the floor. And dressing tables were small and portable, because slaves brought toilet paraphernalia to the master or mistress.

The rocking chair they somehow failed to invent, leaving that for Ben Franklin to think up for America.

Science News Letter, June 11, 1938

ENTOMOLOGY

Insect-Killing Disease Grown in Laboratory

ORGANISMS that cause a deadly disease to tent caterpillars are being cultured at the New York State College of Forestry, to be released in an effort to control the forest tent caterpillar, which has developed into a major pest this season. The disease has been known for a long time, but this is the first attempt that has been made to propagate it artificially and use it as a means of forest defense.

The orchard tent caterpillar, close relative of the forest tent caterpillar, was very bad in 1937, but seems to be on the decrease just now.

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AGRICULTURE

Wake Island's Soilless Farm Well Under Way

WAKE Island's famous soilless farm, built to provide fresh vegetables for maintenance men and Pacific Clipper passengers and crew members making a scheduled stop there on their flights across the Pacific, has already produced its fourth successful crop, Pan American Airways reports.

During the first ten days of May, 33 pounds of tomatoes, 20 pounds of lettuce, 20 pounds of string beans, 15 pounds of squash and 44 pounds of corn were harvested from the shallow water-filled trays in which the crops are grown.

Wake Island's "farm" is cultivated according to methods worked out by Dr. W. F. Gericke of the University of California. In hydroponic farming, as the method is called, water containing essential minerals takes the place of soil. High yields of vegetables can be grown in surprisingly small areas. Wake Island's small area and the expense of shipping or flying food supplies makes adoption of the system there imperative.

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GEOGRAPHY

Labrador Mountains Not Highest Eastern Peaks

MOUNT Mitchell in North Carolina and Mt. Washington, popular vacation spot in New Hampshire, retain their titles as the highest mountains in the highest ranges in North America east of the Rockies, it was learned at the American Geographical Society.

Reports of a chain of mountains in northern Labrador topping the two mile-high peaks are finally disproved with the publication by the Society of the first detailed map of the region. It shows that the highest peak in this supposedly sovereign range is less than 5,500 feet high.

The map accompanies "Northern Labrador Mapped from the Air," the record of three aerial survey expeditions to inaccessible northern Labrador. Aerial survey photographs covering 5,000 square miles of inaccessible territory were made by the three expeditions, under the direction of Dr. Alexander Forbes, professor of physiology at the Harvard Medical School. Old surveying methods would have required much more time and money, it was stated.

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PALEONTOLOGY

You've Never Known Such Animals

If You Can Imagine a Rhinoceros Crossed With a Dachshund, You May Picture Prehistoric Creatures

By DR. FRANK THONE

See Front Cover

WE HAVE all of us had the feeling at one time or other, that some animals are "real" and that others are somewhat fanciful, even though they stand before us in solid flesh and blood, complete with hoofs and hair and horns. Dogs and cats, horses and cows, the deer and the antelope have the "right" shape, color, size. They do not even need to be particularly orthodox: elephants and seals and porcupines pass muster with most of us as "all right."

But confront us with a rhinoceros, or a mandrill, or a duck-billed platypus, and we are apt to balk, like the famous fictional hayseed, and to declare within ourselves, "There ain't no sich animule!"

It is hard to get at the psychological foundation for this involuntary disbelief in the evidence of our own senses. Perhaps it is simply that we have certain conventions or norms about how an animal should look, and if he doesn't look that way—why, so much the worse for him. We just shoo him off our mental retinas as though he were a pink elephant.

Maybe it is a good thing for us, therefore, that we can't take a Wellsian journey backwards through time for the last couple of hundred million years, across the geologic periods that have marked the passing of the dinosaurs and the rise of our own multiform kindred, the mammals. If we find it difficult to believe in our own grandfather in sideburns and plug hat, or an earlier ancestor in the funny-looking pants they wore in Nieuw Amsterdam, what ever would we do about remoter relatives like a gopher with horns, or a jackrabbit with a long catlike tail, or a rhinoceros built on the general lines of a dachshund? Our credulity just wouldn't be able to stand the strain!

Still More Strange

Yet these are only samples of the Past's great menagerie of wild animals we have never known—and by no means the most bizarre of them, at that. We can at least describe these in terms of incredible variants of familiar forms. But some of the other, older creatures simply defy all description. They have no surviving relatives to serve as standards of comparison, and even the scientists who know them best can only flounder a bit helplessly, and say, "Well, this one looked a little like a hippopotamus, and a little like a pig, and something like a horse." It really doesn't help much.

Or, the scientists can assemble their fossil skeletons and then help artists to sketch or model the departed flesh and hide and hair upon them. But even then the results are very apt to be like something Doctor Seuss thought up some night when his imagination was hitting on all cylinders.

If you'd really like to take such a journey into vanished lands of incredibility, just consult that classic work of America's veteran student of ancient mammalian life, The History of Land Mammals in the Western Hemisphere, by Prof. William B. Scott of Princeton, newly published in revised form by the Macmillan Company. The graceful beauty of the deer and the antelope-like forms, the sleek terror of the carnivores, and the utter, indescribable grotesqueness of some of these once-living gargoyles march past in fascinating procession.

100,000,000 Years

The parade takes well over a hundred million years to pass a given spot. For nearly double that length of time the mammals, animals that have warm blood, are (usually) clothed with hair, and suckle their young with milk, have been inhabitants of this planet. For the hundred million years that have elapsed since the last dinosaur died, they have dominated it, in thousands of strange forms, occupying land and water and even air, from Pole to Equator and on down to the Nether Pole. This has been the Age of Mammals, and Prof. Scott is among the foremost of its historians.

Mammals first appeared on earth during the age that preceded their own heyday, the Age of Reptiles, when the ruling forms were the dinosaurs and the other strange giant cold-blooded creatures that lumbered over the land, wallowed in swamps and seas, and soared on leathery wings through the air. It used to be said that mammals appeared only toward the end of that age, but Prof. Scott states that they were there well back toward its beginning, and probably fairly numerous at that. That their fossil remains are rare may be accounted for, perhaps, by conditions unfavorable for preservation rather than by actual scarcity of individuals.

Inconspicuous

Paradoxical though it may seem, the earliest mammals were not at all odd or fantastic in appearance. If we could see one we should probably pay little attention to it, dismissing it as a field mouse or a chipmunk. For these arch-ancestors of all of us, from 'possums to people, were small, mousy creatures. It has been conjectured that they owed their very survival to their inconspicuous size and habits, and possibly also to living in trees, out of reach of most of the hungry reptiles.

Most of their rather scanty fossil relics consist of lower jawbones, and especially of teeth. These were the solidest and hardest parts of their skeletons, likeliest to be preserved under the one-in-a-

BUNNY?

This ancient South American animal might be mistaken for a primitive jackrabbit—but look at the long, un-rabbit-like tail! The restoration drawing is by Charles R. Knight.

thousand chance conditions that attend fossilization. These jaws and teeth indicate that their owners lived largely on a diet of insects. Truly, these Daughters (and Sons) of the Original American Revolution had little claim to aristocratic standing!

For its was a revolution, a long period of violent upheaval and hard times on the earth, that gave mammals their chance, by removing the vast, cumbersome, ultra-conservative royalty of reptiles that had thitherto usurped all places in the sun and kept the meek little furry creatures in age-long subjection. When better times came again, these meek literally inherited the earth.

Branched Out

They straightway set about expanding and multiplying and diversifying, and filled it to overflowing. Line after line of evolutionary descent, through age after age, rejoiced in the freedom and opportunity that was theirs. As among all earlier heirs of any revolution, many of them tried experiments in ways of living that did not work out well. These presently found themselves up blind alleys where further progress was impossible, and so came to nothing.

Yet other some, of all this prodigal extravagance of biological seed, fell on the good ground of favorable environment, and so brought forth fruit an hundred fold: the multiform well-adapted animal life we see today. Including (to be a bit vain about it) that most flexibly-adapted of all the mammals, Man himself.

Not that Man has much part in the history of mammalian life on this continent. He is a late comer, an immigrant. His nearest kin, the primates, are represented even in recent times mainly by the prehensile-tailed monkeys, which are not nearly so closely related to us as are the Old-World apes. Prof. Scott's American Eden gets along without any Adams or Eves.

But there are plenty of other actors, and their performances are interesting, their costumes sometimes astonishing, often beautiful.

One thing that is quite noticeable in earlier parts of the great drama of mammalian life in this hemisphere (and indeed throughout the world) is the development of quite generalized forms: a creature, for example, with claws on its feet, with long jaws and wolf-like legs, that by all the rules of modern zoological logic should be a flesh-eater. Yet the teeth may be adapted only for a rather soft vegetable diet! And at the same time, another line of animals, looking almost its duplicate in general outline, might have the real meat-grinding equipment of carnivores.

REALLY!

Horns have been tried out by many types of animals that no longer wear them. Here is a pair of horned gophers of the weird long ago, as pictured by R. Bruce Horsfall.

Obviously, such unspecialized animals could get along only in a world offering not-too-sharp competition—the more so since they had small brains and were therefore presumably neither very clever nor very agile. Sure enough, they passed, and they have no descendants.

Duplicated

Another striking fact that emerges is a tendency for the same pattern to be repeated by types of animals just about as far apart as it is possible to be and still remain within the mammalian pale. We are all familiar, of course, with the sabertooth tiger, that terrible giant cat that ruled the California hills during the Ice Age in the East. There were other sabertooth cats, a long line of descent. Well, down in South America there have been discovered the fossil remains of an animal with quite as formidable saber-armament projecting from the upper jaw of its round, feline skull. And it isn't a cat at all, not even a carnivore, but a member of the utterly different group that includes opossums, kangaroos, and koalas—it is a marsupial! A restoration drawing of this creature by R. Bruce Horsfall is shown on the cover of this week's SCIENCE NEWS LETTER.

Horns always have been favorite objects for biological experimentation; even the later dinosaurs went in for a lot of cornuary fancy-work. Our present varied array of deer and goats and antelope derive from forebears even more varied. Ancestors of the deer included many forms with antlers considerably simpler and less branched than those of modern representatives of the line. But among them was at least one strange animal with a third, backwardly-projecting horn between the other two!

The pronghorn antelope (which by the way is not a true antelope) stands today as a zoological orphan, with no living relative. But the pronghorn has ancestors, and some of them must have been very impressive in life. They had rather a tendency to develop four horns apiece, and one form had very long horns, twisted into a spiral shape.

Recent Too

It must not be thought that all the grotesque animal clowns belong to the early part of the great show of animal life in the Western World. Some of them were among the latest survivors. There were the glyptodons, for example, huge armored things that one might at first guess assign to the long-gone Age of Reptiles. They lived right up to, and probably through, the Ice Age, of course

staying in the warmer parts of the world.

As fantastic were the immense, lumbering ground sloths, of almost-elephantine size. They were so recent that we have found not only their bones in abundance, but even tendons and skin and hair, and the remains of their last meals. And most astonishing of all, in the same caves with these mummified relics have been discovered stone and wooden implements that tell of the coming to this continent of the latest-born of all the long line of mammals—Man.

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GENERAL SCIENCE

Democracy Declared Best Means Toward Human Goal

DEMOCRACY is the best means toward the goal all men strive for, declared Prof. A. G. Huntsman of the University of Toronto in his address as president of the Royal Society of Canada.

Life, as seen by Prof. Huntsman, is not a condition of static "being" but a flux of constant "becoming," tending always, through all manner of diversities, toward a never-attained goal of perfect order. In a way, these two things are opposed, yet they both are indispensable to life.

"Without diversity," said Prof. Huntsman, "there is death; without order there is chaos. The greater the diversity, the more difficult is the attainment of order. Whether it be in art, in science, or in practical life, based upon science, the goal is to combine the greatest diversity with the most perfect order.

"In man's social organization, whether it be the small community, the nation or the international human world, there is the same goal.

"Recently, the extraordinary increase in diversity in life has resulted in demands for more order. Autocratic rule, regimentation and planned economy are invoked and will inevitably lead toward monotony, comparative death. The mental calibre of a nation is shown by the extent of the diversity that it can weld into a sufficiently orderly, harmonious whole.

"For those peoples that are able to make it work, democracy with its encouragement of individual enterprise presents endless possibilities of advance towards that unattainable goal of full diversity, combined with perfect order."

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PSYCHOLOGY

Four Types of Auto Drivers Are Hazards on the Roads

Watch Out for the Alcoholic, the Feebleminded, The Stupid, and Psychopathic; Direction Sense Real

WATCH out for these types behind the wheel on the highways: the chronic alcoholic; the feebleminded man who is not too feebleminded to make a living; the intellectually inferior who is not feebleminded; and the psychopath or unstable individual.

These are the types of mental disturbance found most often among 348 drivers referred to the Psychopathic Clinic of the Recorder's Court, Detroit, for examination after traffic violations, Dr. Lowell S. Selling, director of the clinic, told members of the Michigan Academy of Science, Arts and Letters.

The accidents in which the chronic alcoholics are involved are largely those due to impulsiveness, Dr. Selling found. These drivers were unable to describe exactly how the accident occurred and tended to blame the other fellow. Probably at the time of the accident the alcoholic driver's hand had been incoordinate, his eyes unable to follow the car in front, and, said Dr. Selling, his field of vision had been somewhat limited at the extreme sides, since there were more crossing accidents than head-on or rear-end collisions among alcoholics.

Feebleminded but economically adjusted persons have all types of accidents, but probably can be safe on the highways if warned that their driving permit will be revoked at the first or second offense, Dr. Selling indicated.

Intellectually inferior but not feebleminded persons also get into all types of accidents. They present a bizarre appearance in court, and will say such things as "I didn't think I needed to stop even though I saw the stop sign."

The fourth group, the unstable or psychopaths, get into trouble because they are so easily upset in a situation where quick judgment is needed. Being late to work, for example, disturbs them so that they will impulsively drive through red lights.

"Sense of Direction"

Ability to point out the direction of distant places is much more common than has been realized, an experiment reported by Dr. Paul D. Woodring, also of the Psychopathic Clinic, revealed.

In a strange room without outside windows, nearly one hundred men and women of a wide range of intelligence were asked by Dr. Woodring to indicate the direction of several well-known places in Detroit, the cities of New York and London, and straight north.

Just about half were able to do so with remarkably small errors. Some did not even hestitate; it was as simple to them as pointing straight up. Others wanted to work out the problem and would take a minute or more to decide.

In addition to these persons who have a "sense of direction" there are others who are "turned around." If they drew a map, the places they locate on it would be in correct relation to each other but there would be about the same amount of error in locating each and it would be in the same direction.

Unaware of Defect

Still others, it turned out, are completely without orientation, but are unaware that they differ in this way from others. They said when confronted with the problem that the whole thing is silly and unfair, that no one can be expected to know the direction of a place that he cannot even see. Like the color-blind, they seldom are aware of any lack.

College students are just as likely to lack orientation as are morons, Dr. Woodring found. He speaks of the ability as a habit rather than a special "sense" or instinct. Although its origin is not well understood, he believes that the well oriented individual may have been taught by parents or by circumstances in his early environment.

Further study of this direction ability may bring to light facts useful in selecting individuals for airplane pilots and similar occupations and may even revolutionize the teaching of geography.

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The peccary is the only native wild pig in North America.

PHYSIOLOGY—PSYCHOLOGY

Loss of Memory, Attention, Found in Deep-Sea Divers

High Pressure May Cause Difficulty in Making Quick Decisions; Unstable Persons Most Affected

By CAPTAIN ERNEST W. BROWN
U. S. N. Medical Corps

THE AVIATOR and the deep-sea diver present an interesting contrast in their environment of activity. The former enters ever decreasing levels of atmospheric pressure as he ascends. The latter enters the opposite condition as he descends into the sea, for the reason that air must be pumped into his diving suit at increasing pressure to offset that of the surrounding sea water.

It is a familiar fact that the aviator as he reaches the higher altitudes is subject to certain psychological effects, the real cause of which is a shortage of oxygen in the air, or, as it is called, anoxemia. When it develops gradually, the subject first has a feeling of alertness, stimulation and well-being, although his judgment may be impaired despite a sense of great confidence. As the condition progresses the powers of attention, memory, hearing, vision, and the finer muscular movements deteriorate but the person may not be aware of the situation.

Recent research has revealed that the deap-sea diver may also develop psychological disturbances as a result of exposure to high air pressure, but this must be due to an entirely different cause. The flier suffers from the effect of low oxygen on the brain but the diver is always breathing higher oxygen than at sea level; in fact a concentration ten times greater at a depth of 300 feet.

It has long been known to diving supervisors that it requires a greater effort to concentrate while under pressure and loss of memory is common, especially in depths exceeding 200 feet, the greater depths therefore retarding the efficiency of the diver.

Definite additions to our knowledge of the psychology of diving have recently been reported from the Second British Admiralty Committee on Deep Diving, the Harvard School of Public Health and the Experimental Diving Unit of the U. S. Navy.

The Admiralty Committee found that certain divers—not all—at 270 to 300 feet experienced what to them were new sensations, that is, difficulty in assimulating facts and in exercising that quick decision which is so essential in successful diving. Others reported that they had become unconscious on the bottom which was inconsistent with the fact that that they had responded to telephone instruction which they were continually receiving. These men became so abnormal mentally or emotionally while under this high pressure that they could remember nothing that they had been doing on the bottom. Other men reported a detached feeling as if under an anaesthetic. This appeared to be an advanced stage of the mental changes which come over certain men at lesser depths. Men so affected were classed as psychologically unstable and a method of psychoanalysis was adopted for the selection of divers for work at great depths.

These symptoms resembled to a great extent the effect on the brain similar to that caused by too low an oxygen pressure. When the men were exposed to pure oxygen in a chamber at a pressure corresponding to 495 feet in depth no abnormal signs were observed; the effects therefore not being due to high oxygen in the air.

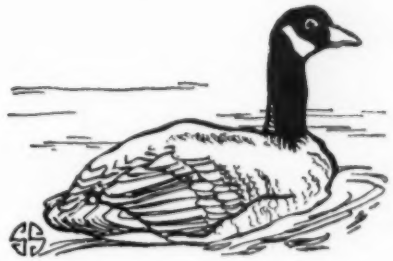
The Harvard group studied the influence of four atmospheres air pressure corresponding to a depth of only 100 feet. They observed a slowing up of mental activity even at this moderate depth.

Tests were carried out at the Experimental Diving Unit in a steel chamber at pressures corresponding to depths of 100 feet to 300 feet and compared with the results at normal pressure. Reaction time was tested by turning a light on and off at irregular intervals, the subject pressing a telegraph key in response to seeing the light. The reaction time was slowed and increasingly so with increased depth.

There are wide differences between individuals in the psychological effects of high air pressure.

CONSERVATION

NATURE RAMBLINGS
by Frank Thone



Ruinous "Improvements"

AMERICA is not the only land where ill-advised "improvements" to rivers have brought loss and trouble in their train. Some of the older countries made their mistakes earlier—and have had longer time to be sorry for them.

A clear-cut example is furnished by the wide floodplain lands of the lower Danube, on the estate of Count Traun, one of the great landholding nobles of Austria. Until the end of the eighteenth century the river floods were allowed their own way on the flatlands. They deposited fertile silt, which made for lush growth of vegetation and rich forests.

Then, early in the nineteenth century, the river was "improved." Its channel was straightened, and levees were built to keep its floods away from a large part of the former overflow lands.

Today the consequences are tragically evident. The protected lands back of the levees have been stripped of their forest cover, where they had it, and all of the land has been so intensively cultivated that the alluvial soil has been "mined" of its plant nutrient wealth. And of course, no new silt deposits can be brought by the river to renew it.

Between the levees the condition is even worse. The river, in its straightened, narrowed channel, rushes through rapidly. When high water occurs, it boils out onto the restricted flood plain that has been left to it. Long since, it carried off the rich surface soil it had once deposited. In its stead, the river now dumps gravel and coarse sand. The land that was once almost tropically luxuriant meadow and swamp-forest is now a tortured, sterile desert.

PSYCHOLOGY

Psychology in Germany Has Suffered "Virtual Collapse"

Number of Papers Has Dropped, Famous Leaders Have Migrated; Scientists Wonder About Austria

POLITICAL conditions in Nazi Germany have crippled psychological science in that country, it is revealed by Dr. J. B. Maller, of Teachers College, Columbia University (*Journal of Consulting Psychology*, May-June).

Formerly famous as a center of psychological research, German scientists are scattered and research programs shattered. A "virtual collapse of scientific psychology," it is termed by Dr. Maller.

In terms of publication, the loss is indicated by a decline from 8,921 publications in the field of psychology listed in the "Psychological Index" for the four years 1928-31 to only 3,820 during the years 1932-35. During the earlier period, more than a third, 35.4 per cent., of all psychological publications came from Germany. Her contribution during the later period was only 15.8 per cent.

In terms of individual scientists, Germany's loss is shown by Dr. Maller's list of great German psychologists now living in the United States:

Dr. Wolfgang Kohler, Dr. Max Wertheimer, Dr. Bruno Klopfer, Dr. Erwin Levy, Dr. Hans Wallach, and Dr. Kurt Lewin, of Berlin; Dr. Martin Scheerer and Dr. Heinz Werner, of Hamburg and Dr. Olga Marum, of Cologne.

Among those in exile in other countries, Dr. Maller lists Dr. Edward Spranger of Berlin now in Tokio, Dr. William Peters of Jena now in Istanbul, Dr. Walter Blumenfeld of Dresden now in Lima, Peru, Dr. A. Angelander of Jena and Dr. Karl Dunker of Berlin now in London, Dr. Erich Stern of Giessen now in Paris, Dr. Helmut von Bracken of Brunschweig now in Amsterdam, Prof. D. Katz of Rostock now in Stockholm, and Dr. Werner Wolff of Berlin now in Barcelona.

"Many German psychologists have suffered greatly from the savage persecution of non-Aryans," Dr. Maller said. "But the severest blow to them was the fact that the discrimination was based on a pseudo-psychology of race differences which is no more than a jumble of wishful thinking and wilful misrepresentation."

Psychologists and psychiatrists are speculating with concern on the probable similar collapse of these sciences in Vienna, another famous center for research in these fields. Of the scientists known prominently in the United States, some are known to be already in exile, others have been arrested, and more have disappeared—their friends abroad afraid to search for them or try to communicate with them.

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A 15,000 acre plantation in the Belgian Congo is to be devoted to growing chinchona, source of quinine.

PSYCHOLOGY

Rat Experiments Give Clue To Creative Thinking in Man

Process By Which Problems Are Solved Can Survive Brain Injury, But Cannot Be Acquired Afterwards

"THE idea popped into my head."

This expression has its scientific basis in an unconscious or subconscious mental process which has been the subject of experiments conducted at the University of Michigan, by Dr. Norman R. F. Maier.

The suddenness with which the solution of a bothersome problem may strike us often gives us quite a jar. It may seem like an inspiration from without. But Dr. Maier's experiments indicate that the solution is made up of facts already in our possession as memories, now put together in altogether new relations. In the new combination the facts have new meaning, Dr. Maier explains, and it is this that produces the surprise.

But how does this new combination happen to be formed? That is the whole basis of creative thinking. Psychologists call the process "direction."

Positive evidence of "direction" is provided by Dr. Maier's experiments. (*Comparative Psychology Monographs*, April)

The experiments were with rats. Yes, they have "direction" and are capable of creative thinking, too.

The direction was established through solving certain problems previous to a brain operation. They were still able to solve the problems after the operation. Animals which do not have the "direction" process established before the operation can not establish it afterwards and fail on the problems.

"Direction," Dr. Maier found, once established can survive brain operation but cannot be acquired after certain brain injuries. Memories, on the other hand, may be lost through brain injury, but can be acquired afterward. This distinguishes clearly between memories and the "direction" process. They are not the same.

"Since the 'direction' process is not a memory it has less specific conscious states and human beings are therefore quite unaware of how and where they find solutions to problems," Dr. Maier said.

"They may have the consciousness of playing with thoughts and suddenly find that they have a solution. The 'direction' process has been doing its work in producing an integration and is not wholly in a person's awareness until it has produced a new combination of old elements."

Science News Letter, June 11, 1938

AERONAUTICS

Multi-Engined "Airacuda" Invades Pursuit Ship Field

A NEW conquest for the big plane, America's primary contribution to aeronautics during the last decade, and the eclipse of the romantic single-seat pursuit ship are foreseen in the U. S. Army Air Corps order for 13 "Airacuda" fighters, the world's deadliest wasps.

Under test for a year, the "Airacuda" is the first fighter in the world in the "big plane" class. It is the first fighter with a range comparable to that of the medium-sized transport.

Designed to meet the Army Air Corps aim of being able to strike with lightning-like rapidity anywhere within the western hemisphere in defense of the Monroe Doctrine, the "Airacuda" and the fast-flying, long-range flying fortresses pioneered by American military aviation promise an immediate revolution in aerial strategy.

With its two rapid-fire cannon and four machine guns, the "Airacuda" is probably capable of taking care of more than one pursuit ship at a time. It is too big to be as maneuverable, but it doesn't need such great shiftiness because of the many directions in which its arsenal is aimed.

Certainly three years ahead of anything else in the aeronautics field with which it can be compared, it is comparable in its advanced design to the four-engined bombers which are now in regular combat use in the U. S. Army. Four-engined bombers are still several years from combat use in Europe.

The plane is unorthodox in many more ways than one. In the first place, it is powered by pusher-propellers, directly contradicting recent aeronautics practice. An advantage gained from this type of propulsion is the freedom of the machine-gunner from a propeller slipstream.

Its Allison engines, of secret design, are among the most powerful liquid-cooled engines ever built. The plane is completely fitted for night flying and has the most advanced navigation equipment. The crew members work in heated compartments, which are necessary because of its unusually high service ceiling, 30,000 feet.

So unusual is the "YEM-1" fighter, as it is known in the Army, that it is believed that it definitely opens a new era in military aviation. Its effect on comparable planes may even be compared to the effect of the dreadnaught, which immediately outdated all existing battleships when it was introduced at the beginning of the twentieth century by the British Admiralty.

Science News Letter, June 11, 1938

• Radio

Every Friday at 7:30 p. m. EDT, 6:30 p. m. EST, 5:30 p. m. CST, 4:30 p. m. MST, or 3:30 p. m. PST, Science Service cooperates with the Columbia Broadcasting System in presenting over the Columbia coast to coast network a new series of "Adventures in Science" presenting dramatizations of important scientific advances and discussions by eminent scientists.

•First Glances at New Books

Medicine

THE FIGHT FOR LIFE—Paul de Kruif—*Harcourt, Brace,* 342 p., $3. Here is a de Kruif book with all the thrill of former books by this author plus the new one of a new, heart-string-pulling, challenging viewpoint. (Apologies to the author—the style is catching.) Mr. de Kruif is no longer content to paint romantic pictures of scientific discoveries and to give dramatic, behind-the-scenes accounts of laboratory and field work. He insists now on making his readers think about how science can be used not just to save one life or even hundreds of lives, but to safeguard for every individual his right to live.

Science News Letter, June 11, 1938

Archaeology

A REPORT OF THE SUSQUEHANNA RIVER EXPEDITION SPONSORED IN 1916 BY THE MUSEUM OF THE AMERICAN INDIAN, HEYE FOUNDATION—Warren King Moorehead, comp.—*Andover Press,* 144 p., illus., $2.45. The first detailed reconnaisance study and mapping of Indian sites in an area important in history. From what this expedition learned, Prof. Moorehead suggests that professional archaeologists might well spend four seasons of intensive surveying along this route.

Science News Letter, June 11, 1938

Botany

THE AMERICAN SPECIES OF PASSIFLORACEAE—Ellsworth P. Killip—*Field Museum of Natural History,* 2 Vols., 613 p., $2.50 per vol. Monographic treatment of an interesting and difficult group of plants. Botanists will be glad to have the data on this group, hitherto badly scattered, thus critically collated.

Science News Letter, June 11, 1938

Radio

RADIO AND ELECTRONIC DICTIONARY—Harold P. Manly, comp.—*Drake,* 300 p., illus., $2.50. An illustrated dictionary covering terms used in radio, television, sound pictures, public address, photocell and electrical work. Nearly 4,000 terms are listed and defined.

Science News Letter, June 11, 1938

Biology

EMBRYONIC DEVELOPMENT AND INDUCTION—Hans Spemann—*Yale Univ. Press,* 401 p., $5. This book is addressed primarily to professional biologists and it will be received by them with eagerness gauged by the eminence of its author, who has been a world leader in the development of embryology as a dynamic science. It was developed out of a series of Silliman Lectures at Yale University.

Science News Letter, June 11, 1938

Astronomy

OUR STARLAND, AN EASY GUIDE TO THE HEAVENS—C. C. Wylie—*Lyons and Carnahan,* 378 p., 88 c. New astronomy text for grammar school students by the University of Iowa's associate professor of astronomy. Dr. Wylie describes the whole gamut of elementary astronomy and star gazing simply and clearly. The earth, moon and planets, the calendar, the night sky, legends of constellations and star maps are all given. Particularly interesting is the section on comets and meteors. Copious use is made of pictures, drawing and diagrams, suitable for the juvenile readers.

Science News Letter, June 11, 1938

General Science

THE GRAMMAR OF SCIENCE (New Ed.)—Karl Pearson—*Dutton,* 357 p., $1. (Everyman's Library, No. 939) A classic of science made available to a larger audience.

Science News Letter, June 11, 1938

Marine History

WATCHMEN OF THE SEA: The Story of the United States Coast Guard—Glen Perry—*Scribner's,* 229 p., $2. Description of the work of the U. S. Coast Guard, and accounts of some of the more notable incidents in its history. There are numerous striking illustrations.

Science News Letter, June 11, 1938

Biology—Chemistry

THE ORIGIN OF LIFE—A. I. Oparin; Sergius Morgulis, tr.—*Macmillan,* 270 p., $2.75. Translation of a book that has been widely read in its original Russian. The author speculates rather conservatively, along lines of known chemical fact, on the possible mode of origin of life on the primeval earth. He believes there was a long pre-organic evolution of chemical compounds, especially of the carbon compounds, before anything recognizable as an actual organism came into being.

Science News Letter, June 11, 1938

Natural History

ANNUAL REPORT OF THE DIRECTOR TO THE BOARD OF TRUSTEES FOR THE YEAR 1937—*Field Museum of Natural History,* 304 p., $1.

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Biography

PASTEUR, KNIGHT OF THE LABORATORY—Francis E. Benz—*Dodd, Mead,* 232 p., $2. The story of Pasteur has been told over and over, until one would imagine it impossible to tell it again without threshing empty straw. Yet this new book does tell it again, in such fascinating wise that even a veteran reader of Pasteuriana finds himself devouring page after page. Pasteur had a dramatic life; the present author realizes this well and takes full advantage of the striking highlights and vivid episodes.

Science News Letter, June 11, 1938

Biography

CHARLES DARWIN, A PORTRAIT—Goeffrey West—*Yale Univ. Press,* 359 p., $3.50. A really definitive biography, honestly and critically worked out. The author takes away the halo which some adulatory writers have placed above Darwin's brows; yet this is by no means a "debunking" book.

Science News Letter, June 11, 1938

Mathematics

THE KELLEY STATISTICAL TABLES—Truman Lee Kelley—*Macmillan,* 136 p., $4.50. With an enormous amount of work Prof. Kelley has revised and computed the tables of statistics used in biometrics calculation. Normal distribution, simple correlation and probability functions are computed to eight decimal places.

Science News Letter, June 11, 1938

Sociology

AN ISLAND COMMUNITY; Ecological Succession in Hawaii—Andrew W. Lind—*Univ. of Chicago,* 337 p., $3. The Hawaiian Islands have long been a favorite resort of students of plant and animal ecology. In the present work, the professor of sociology at the University of Hawaii undertakes a study in human ecology, particularly the story of the coming of new races from east and west and the development of plantation agriculture in its effects on the primitive small-scale cultivation and the hitherto undisturbed native vegetation.

Science News Letter, June 11, 1938

Physiology

ILLNESS: ITS STORY AND SOME COMMON SYMPTOMS. A GUIDE FOR THE LAYMAN—S. Henning Belfrage—*Oxford Univ. Press,* 175 p., $1.50. Simply written information about everyday health questions the layman wants answered.

Science News Letter, June 11, 1938